

PATENT COOPERATION TREATY

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Commissioner
 US Department of Commerce
 United States Patent and Trademark
 Office, PCT
 2011 South Clark Place Room
 CP2/5C24
 Arlington, VA 22202
 ETATS-UNIS D'AMERIQUE
 in its capacity as elected Office

Date of mailing (day/month/year) 02 August 2001 (02.08.01)	
International application No. PCT/US00/28563	Applicant's or agent's file reference 43040
International filing date (day/month/year) 13 October 2000 (13.10.00)	Priority date (day/month/year) 20 October 1999 (20.10.99)
Applicant TSOU, Yu-Min et al	

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:
 12 April 2001 (12.04.01)

☐ in a notice effecting later election filed with the International Bureau on:

2. The election ☒ was

☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

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The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No.: (41-22) 740.14.35	Authorized officer B. Wyss (Fax 338.87.40) Telephone No.: (41-22) 338.83.38
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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 43040	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/US00/28563	International filing date (day/month/year) 13/10/2000	Priority date (day/month/year) 20/10/1999
International Patent Classification (IPC) or national classification and IPC B22F1/02		
Applicant THE DOW CHEMICAL COMPANY et al.		
<p>1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 7 sheets, including this cover sheet.</p> <p><input type="checkbox"/> This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).</p> <p>These annexes consist of a total of sheets.</p>		
<p>3. This report contains indications relating to the following items:</p> <ul style="list-style-type: none">I <input checked="" type="checkbox"/> Basis of the reportII <input type="checkbox"/> PriorityIII <input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicabilityIV <input checked="" type="checkbox"/> Lack of unity of inventionV <input checked="" type="checkbox"/> Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statementVI <input type="checkbox"/> Certain documents citedVII <input type="checkbox"/> Certain defects in the international applicationVIII <input checked="" type="checkbox"/> Certain observations on the international application		
Date of submission of the demand 12/04/2001	Date of completion of this report 23.11.2001	
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Alvazzi Delfrate, M Telephone No. +49 89 2399 8444 	

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/US00/28563

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):
- Description, pages:**

1-16 as originally filed

Claims, No.:

1-27 as originally filed

Drawings, sheets:

1/2-2/2 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

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☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

IV. Lack of unity of invention

1. In response to the invitation to restrict or pay additional fees the applicant has:

- ☐ restricted the claims.
☐ paid additional fees.
☐ paid additional fees under protest.
☐ neither restricted nor paid additional fees.

2. ☒ This Authority found that the requirement of unity of invention is not complied and chose, according to Rule 68.1, not to invite the applicant to restrict or pay additional fees.

3. This Authority considers that the requirement of unity of invention in accordance with Rules 13.1, 13.2 and 13.3 is

- ☐ complied with.
☒ not complied with for the following reasons:
see separate sheet

4. Consequently, the following parts of the international application were the subject of international preliminary examination in establishing this report:

- ☒ all parts.
☐ the parts relating to claims Nos. .

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims 2, 4, 6-15, 17-20, 22-25
	No:	Claims 1, 3, 5, 16, 21, 26-27
Inventive step (IS)	Yes:	Claims 7-15, 17-20
	No:	Claims 1-6, 16, 21-27

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/US00/28563

Industrial applicability (IA) Yes: Claims 1-27
 No: Claims

2. Citations and explanations
 see separate sheet

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:
see separate sheet

Reference is made to the following documents:

- D1: US-A-3 486 928 (RICHARD N. RHODA) 30 December 1969 (1969-12-30)
D2: US-A-5 645 930 (YU-MIN TSOU) 8 July 1997 (1997-07-08) cited in the application
D3: EP-A-0 174 413 (ELTECH SYSTEMS CORPORATION) 19 March 1986 (1986-03-19)

1 Re item V: novelty and inventive step

- 1.1 Document D1 (column 3, line 14- 22) relates to composite powders having catalytic properties and useful in the production of electrodes. The powder of D1 is formed by depositing Pt on Ni particles. The deposit is produced by an electroless bath (examples) and appears to consist of a continuous and porous Pt phase (column 3, line 14- 22). Therefore, the powder of claim 1 is not novel in view of D1.
- 1.2 The subject-matter of the dependent claims 3 and 5 is not novel for the same reasons as above.
- 1.3 The particle size of claim 6 is usual in the art of catalytic powders and would be adopted by the skilled practitioner without the need of an inventive skill.
- 1.4 The use of reinforcing oxide particles in electrocatalytic coatings is known from D2 (column 7, line 31-45 and Fig. 1). Accordingly, the subject-matter of claims 2 and 4 is regarded as lacking an inventive step in view of the combination of D1 and D2.
- 1.5 D3 (claims 1 and 4) is regarded as the closest available prior art for the electrode of claim 7. D2 discloses an electrode wherein a conductive substrate is coated with a matrix embedding a catalytic powder. The claimed electrode is novel over D3 in that the catalytic powder comprises support metal particles covered with an electrocatalytic metal porous coating. Such a novel feature, creating a larger

internal surface area, solves the problem of lowering the effective current density and, accordingly, overpotentials (page 3, line 24-27). The claimed solution is neither disclosed nor suggested by the available prior art. Therefore, the independent claim 7 and the dependent claims 8-15 are regarded as relating to novel and inventive subject-matter.

- 1.6 D2 discloses (column 4, line 31-67 and example 1) a process for making an electrode. The process of D2 uses a catalytic powder (in the example ruthenium oxide) which has been formed somehow. The powder is mixed with a dispersing medium and applied on a conductive metal substrate for instance by thermal spraying. The covered substrate is baked in the presence of oxygen. In a further step plating with a reinforcement layer of a transition metal such as Ni is performed (column 5, line 1-17). Therefore, the process of claim 16 is not novel in view of D2.
- 1.7 The subject-matter of claims 21, 26 and 27 lacks novelty in view of D2 for the reasons detailed above.
- 1.8 The additional features of claims 22-25 seem to be either known from D3 (examples 1 and 5) or part of the standard knowledge of the skilled practitioner. Accordingly, no inventiveness is seen in the subject-matter of said claims.
- 1.9 Claim 17 and the claims 18-20, depending on it, relate to novel and inventive subject-matter for the reasons detailed above for claim 7.

2 Re item IV: unity

The common concept linking together the independent claims 1 (directed to a catalytic powder comprising transition metal particles coated by an electrocatalytic metal continuous phase), 7 (directed to an electrode comprising a matrix embedding a catalytic powder consisting of metal particles coated by an electrocatalytic metal containing phase) and 16 (directed to a process for producing an electrode comprising the step of forming a catalytic powder) is merely a catalytic powder.

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/US00/28563

Catalytic powders are known in the art, for instance from D1. Therefore, the requirements of unity of invention are not met (Rule 13 PCT).

3 Re item VIII: clarity

The terms "electrocatalytic metal", "valve metal", "catalytic powder" do not appear to have a precise meaning in the art. Accordingly, the claims using said terms, in particular the independent claims 1, 7 and 16, are regarded as unclear.

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INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 43040	FOR FURTHER ACTION see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. PCT/US 00/ 28563	International filing date (day/month/year) 13/10/2000	(Earliest) Priority Date (day/month/year) 20/10/1999
Applicant THE DOW CHEMICAL COMPANY et al.		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 4 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

- a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).
- b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :
- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ **Certain claims were found unsearchable** (See Box I).

3. ☐ **Unity of invention is lacking** (see Box II).

4. With regard to the title,

- ☐ the text is approved as submitted by the applicant.
- ☒ the text has been established by this Authority to read as follows:

CATALYTIC POWDER AND ELECTRODE MADE THEREWITH

5. With regard to the abstract,

- ☐ the text is approved as submitted by the applicant.
- ☒ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No.

- ☒ as suggested by the applicant.
- ☐ because the applicant failed to suggest a figure.
- ☐ because this figure better characterizes the invention.
- 1
☐ None of the figures.

Box III TEXT OF THE ABSTRACT (Continuation of item 5 of the first sheet)

A catalytic powder comprising a plurality of support metal particles with a porous coating (12) surrounding the metal particles (11), the porous coating comprising either an electrocatalytic metal or an electrocatalytic metal continuous phase in admixture with a particulate material (14). An electrode made with the catalytic powder and a method to make the electrode is also disclosed. The present invention is advantageous because the porous coating mixture is first applied to a powder rather than being applied directly to a metal substrate, thereby creating a large internal surface area on the electrode and accordingly, lower overpotential requirements.

INTERNATIONAL SEARCH REPORT

International Application No

PC 00/28563

A. CLASSIFICATION OF SUBJECT MATTER IPC 7 B22F1/02 B22F3/11 C25B11/03 C25B11/04		
According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) IPC 7 B22F C25B		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practical, search terms used) EPO-Internal, WPI Data		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 3 486 928 A (RICHARD N. RHODA) 30 December 1969 (1969-12-30) column 3, line 14 - line 23 column 4; example 2	1,3,5
Y	---	2,4
Y	US 5 645 930 A (YU-MIN TSOU) 8 July 1997 (1997-07-08) cited in the application column 7, line 31 - line 45 column 8, line 4 - line 19 figures 1,2	2,4
X	column 14, line 23 - line 31 ---	16
X	EP 0 174 413 A (ELTECH SYSTEMS CORPORATION) 19 March 1986 (1986-03-19) page 13, line 10 - line 30 page 24; example 6 ---	1,3
-/--		
<div style="display: flex; justify-content: space-between;"> <input checked="" type="checkbox"/> Further documents are listed in the continuation of box C. <input checked="" type="checkbox"/> Patent family members are listed in annex. </div>		
<div style="display: flex;"> <div style="flex: 1;"> <p>* Special categories of cited documents :</p> <p>*A* document defining the general state of the art which is not considered to be of particular relevance</p> <p>*E* earlier document but published on or after the international filing date</p> <p>*L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>*O* document referring to an oral disclosure, use, exhibition or other means</p> <p>*P* document published prior to the international filing date but later than the priority date claimed</p> </div> <div style="flex: 1;"> <p>*T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>*X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</p> <p>*Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>* & * document member of the same patent family</p> </div> </div>		
Date of the actual completion of the international search <div style="text-align: center; font-weight: bold;">8 February 2001</div>		Date of mailing of the international search report <div style="text-align: center; font-weight: bold;">16/02/2001</div>
Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016		Authorized officer <div style="text-align: center; font-weight: bold;">Groseiller, P</div>

INTERNATIONAL SEARCH REPORT

International Application No

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4 724 052 A (ANTONIO NIDOLA) 9 February 1988 (1988-02-09) column 3, line 18 - line 22 claims 1,10 -----	7

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PC 00/28563

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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		SE 327877 B	31-08-1970
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		WO 9807899 A	26-02-1998
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		CA 1226272 A	01-09-1987
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		PL 256789 A	09-02-1987
		SK 920685 A	10-12-1997

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/00/28563

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4724052 A		RU 2018543 C	30-08-1994
		US 4938851 A	03-07-1990
		DD 241091 A	26-11-1986
		DD 249721 A	16-09-1987
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